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Federal Communications Commission

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
Rulemaking to Amend Parts 1, 2, 21, and 25) CC Docket No. 92-297
of the Commission's Rules to Redesignate)
the 27.5-29.5 GHz Frequency Band, to)
Reallocate the 29.5-30.0 GHz Frequency Band,)
to Establish Rules and Policies for Local)
Multipoint Distribution Service and for)
Fixed Satellite Services)
)

THIRD REPORT AND ORDER

Adopted: October 9, 1997

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By the Commission:

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APPENDIX A: Rule Amendments to 47 C.F.R. Part 25 of the Commission's Rules

APPENDIX B: Final Regulatory Flexibility Analysis

I. Introduction

1. With this *Report and Order*, we adopt licensing qualification requirements and service rules for a new generation of fixed-satellite service ("FSS") systems in the Ka-band.¹ The satellite systems that will operate in this band represent a new age in satellite communications. These systems have the potential to provide a wide variety of broadband interactive digital services in the United States and around the world including: voice, data, and video; videoconferencing; facsimile; computer access and telemedicine. The systems can provide direct-to-home services, potentially allowing customers to participate in activities from distance learning to interactive home shopping.

¹ The term "Ka-band" generally refers to the space-to-Earth (downlink) frequencies at 17.7-20.2 GHz and the corresponding Earth-to-space (uplink) frequencies at 27.5-30.0 GHz, or the "28 GHz band." This *Report and Order* pertains only to U.S. non-Government satellite systems in the Ka-band.

2. The commercialization of the Ka-band spectrum will give rise to a dynamic new satellite market, potentially stimulating significant economic growth both in the United States and abroad. These systems also represent an opportunity for the United States to continue its leadership role in promoting global development through enhanced communication infrastructures and services. They also represent a major step in achieving a seamless information infrastructure.

II. Background

3. The Ka-band is currently unused commercially for satellite-based communications in the United States.² The band will serve as an expansion alternative to the crowded C- and Ku- bands for traditional fixed-satellite service.³ In addition, the satellite industry perceives the Ka-band as ideal for the development of FSS broadband services provided directly to users' homes. Because of the wavelength characteristics of this higher frequency band, the Ka-band has the capability to permit the use of very small earth station user antennas and to provide high-speed, broadband interactive services on demand.

4. The National Aeronautics and Space Administration (NASA) was the "pioneer" of satellite technology for the Ka-band. In September 1993, NASA launched the Advanced Communications Technology Satellite (ACTS), which is currently operating in the Ka-band.⁴ NASA's intent in implementing the ACTS system was to develop the Ka-band technology for subsequent use by the U.S. communications industry. The successful launch and operation of this experimental satellite initiated interest in the Ka-band by the satellite industry.

5. In 1993, Hughes Communications Corporation filed an application for a two-satellite domestic FSS system using geostationary-satellite orbit ("GSO") satellites in the Ka-band.⁵ It later amended the application to expand the system to a 17 satellite global system.

² In July 1990, Norris Satellite Communications Inc. (Norris) filed an application to provide satellite services in the Ka-band and obtained an authorization in 1992. In 1996, the International Bureau declared Norris's authorization null and void for failing to begin construction. *See* Norris Satellite Communications, Inc. For Authority to Construct, Launch, and Operate a Ka-Band Satellite System, *Order*, 11 FCC Rcd 5402 (1996). The Commission recently affirmed the Bureau's decision. *See* Application for Review of Order Denying Extension of Time to Construct and Launch Ka-Band Satellite System, *Memorandum Order and Opinion*, FCC No. 97-377, (released October 10, 1997).

³ The "C-band" refers to the 3700-4200/5925-6425 MHz frequency bands. The "Ku-band" refers to the 11.7-12.2/14.0-14.5 GHz bands.

⁴ ACTS is operating at 100° West Longitude. Approximate end of life for ACTS is 1999.

⁵ Geostationary satellites orbit 22,300 miles above the Earth in the plane of the Earth's equator. At this altitude, the satellite's position appears fixed relative to an observer on the Earth. Non-geostationary satellite orbit ("NGSO") satellites operate at lower altitudes and therefore appear to move from horizon to

In 1994, Teledesic Corporation filed for authority to construct, launch, and operate a satellite system composed of 840 satellites in non-geostationary satellite orbit ("NGSO") to provide domestic and international FSS in the Ka-band. Subsequently, Loral Space Communications Ltd., PanAmSat Licensee Corporation, and KaStar Satellite Communications Corp. filed applications for Ka-band GSO systems.

6. The Ka-band is allocated for fixed service, FSS, and mobile service.⁶ In July 1995, the Commission adopted a Third Notice of Proposed Rulemaking proposing, among other things, a band segmentation plan that was designed to accommodate both terrestrial and satellite communication systems.⁷ Specifically, we proposed discrete band segments for the operation of terrestrial Local Multipoint Distribution Service ("LMDS"), GSO FSS, NGSO FSS, and feeder links for certain "Big LEO" mobile-satellite service ("MSS") satellite systems.⁸ We also proposed to apply the existing rules for GSO FSS systems in Part 25 of the Commission's rules⁹ to GSO FSS systems that will use the 28 GHz band. We requested comment, however, on whether specific rules, such as financial qualification requirements, should be altered for Ka-band satellite systems and whether any additional rules should be created for either GSO FSS systems or NGSO FSS systems operating at Ka-band.

7. The same day as the *Third NPRM* was released, we issued a Public Notice describing the five Ka-band satellite system proposals already on file and establishing a September 29, 1995 cut-off date for filing applications to be considered concurrently with these.¹⁰ In the Public Notice, we said that we would afford all applicants filing by the cut-off

horizon. An NGSO satellite's orbital period is less than twenty-four hours.

⁶ See 47 CFR § 2.106. The 29.5-30.0 GHz band is also allocated on a primary basis to the Mobile-Satellite Service (MSS); however, in accordance with the International Telecommunication Union (ITU) Radio Regulation S5.529, use of the 29.5-30.0 GHz band by the MSS in Region 2 is limited to satellite networks which are both in the FSS and MSS.

⁷ See Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, *Third Notice of Proposed Rulemaking*, 11 FCC Rcd 53 (1995) (*Third NPRM*).

⁸ Feeder links for Big LEO systems use frequencies allocated to the FSS to interconnect a mobile satellite space station with other fixed terrestrial communication networks by means of one or more central earth stations. The user transceivers, or service links, are connected to the mobile satellite space stations using the MSS allocations.

⁹ See 47 CFR §§ 25.114, 124.140, and 25.210.

¹⁰ See Ka-band Satellite Applications Accepted for Filing: Cut-off Established for Additional Applications, Public Notice, Report No. SPB-20, DA 95-1689 (released July 28, 1995).

date an opportunity to amend their applications to conform with any requirements and policies that we may later adopt. Because we proposed that GSO and NGSO satellite systems would be operating on different frequencies, we also stated that we envisioned considering them in separate processing groups.

8. At that time, we received no new applications for NGSO FSS systems.¹¹ Eleven entities filed new applications for GSO FSS systems and all four pending GSO FSS applicants filed amendments to their applications. The new applicants were: AT&T Corp., Comm, Inc., EchoStar Satellite Corporation, GE American Communications, Inc., Lockheed Martin Corporation, Morning Star Satellite Corporation, NetSat 28 Company, L.L.C., Orion Asia Pacific Corporation, Orion Atlantic, L.P., Orion Network Systems, Inc., and VisionStar, Inc.¹² The GSO applicants propose to invest a total of over \$23 billion for 75 GSO satellites to be located around the world.

9. In November 1995, the World Radio Conference ("WRC-95") adopted a resolution, Resolution 118, which removed, in a portion of the Ka-band, the applicability of the International Telecommunication Union (ITU) Radio Regulation No. S22.2 (2613).¹³ That regulation requires NGSO FSS systems to cease or reduce to a negligible level their operations whenever there is unacceptable interference caused to a GSO FSS system, regardless of the order in which the systems were notified or implemented. WRC-95 Resolution 118 identified 500 MHz of paired spectrum at 28.6-29.1 GHz (uplink) and 18.8-19.3 GHz (downlink) for NGSO FSS systems. The 28.7-29.1 GHz and 18.9-19.3 GHz bands were made available for immediate NGSO FSS use, while the 28.6-28.7 GHz and 18.8-18.9 GHz bands were "frozen" with further action to be considered at WRC-97, dependent upon the results of ongoing sharing studies.¹⁴

¹¹ In June 1997, Motorola Global Communications, Inc., filed an application proposing an NGSO FSS satellite system, consisting of 63 satellites, for operation in the Ka-band.

¹² See Ka-Band Satellite Applications Accepted for Filing: Request for Comment on Ka-Band Feeder Link Application; Public Notice, Report No. SPB-29, 10 FCC Rcd 13753 (1995). AT&T Corp. subsequently decided to withdraw all of its Ka-band applications. See Letter from Mark C. Rosenblum, AT&T Vice President- Law and Public Policy, to Peter Cowhey, Chief, International Bureau, FCC (May 1, 1997).

¹³ See Resolution 118 Final Acts of the World Radiocommunication Conference (Geneva 1995).

¹⁴ "Frozen" refers to the fact that the ITU's Radiocommunication Bureau will return any satellite system notifications received, or considered to be received, from any administration after 17 February 1996 and until the last day of WRC-97. Resolution 118 calls for the ITU Radiocommunication Sector (ITU-R) to study conditions for sharing between GSO and NGSO FSS systems, between NGSO FSS systems, and between NGSO FSS and terrestrial systems. These studies are to be taken into account in determining whether the changes adopted for the 28.7-29.1/18.9-19.3 GHz bands should also be adopted for the frozen bands, and whether any other adjustments in spectrum allocations are warranted.

10. In May 1996, the International Bureau (Bureau) assigned orbit locations to those applicants proposing to provide international FSS from their GSO systems.¹⁵ This assignment plan was the result of the applicants' successful efforts to resolve their conflicts over orbit locations for satellites in the 62° West Longitude to 175.25° East Longitude region of the orbital arc. In the Assignment Plan, the Bureau indicated that the assignments were conditioned on the grant of the domestic orbital assignments in the respective satellite systems.

11. In July 1996, the Commission issued a *First Report and Order and Fourth Notice of Proposed Rulemaking* adopting, among other things, a final band plan for the Ka-band.¹⁶ This plan was the culmination of months of discussions with interested parties and filings in the proceeding since the release of the *Third NPRM*. The band plan adopted provides a framework that accommodates all commercial proposed services in discrete band segments and provides the opportunity to offer innovative communications services to the public. The plan designates 1000 MHz of primary and co-primary uplink spectrum and 1600 MHz of primary and co-primary downlink spectrum to GSO FSS systems; 500 MHz of primary uplink and 500 MHz of primary downlink spectrum to NGSO FSS systems; and 1000 MHz of primary and co-primary spectrum to LMDS. The *Fourth NPRM* proposing an additional 300 MHz for LMDS at 31.0-31.3 GHz was also adopted.¹⁷

12. In February 1997, the GSO satellite applicants reached an agreement regarding conflicts over requested locations in the orbital arc best suited for providing domestic service to the United States. The applicants, due to their continued efforts, reached an agreement regarding orbital locations between 67° W longitude to 148° E longitude, effectively eliminating the major obstacle to quick grant of their applications. As part of this agreement, the GSO satellite applicants also agreed to withdraw their petitions and other pleadings filed with respect to each others' applications in the current processing round.¹⁸

¹⁵ See Assignment of Orbital Locations to Space Stations in the Ka-Band, 11 FCC Rcd 13737 (1996).

¹⁶ See In the Matter of Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, *First Report and Order and Fourth Notice of Proposed Rulemaking*, 11 FCC Rcd 19005 (28 GHz *First Report and Order*). This decision is subject to petitions for reconsideration. The band plan is depicted graphically and discussed in more detail in ¶¶ 39-49, *infra*.

¹⁷ See 28 GHz *First Report and Order* ¶¶ 95-104.

¹⁸ See Letter from GSO applicants to Thomas S. Tycz, Chief, Satellite and Radiocommunication Division, International Bureau (February 10, 1997).

13. In March 1997, the Bureau authorized Teledesic Corporation (Teledesic) to construct, launch, and operate its proposed NGSO FSS system.¹⁹ In May 1997, the Bureau authorized thirteen GSO FSS companies to construct, launch, and operate their proposed GSO FSS systems.²⁰ All authorizations are subject to compliance with any rules we adopt today.

III. Discussion

14. The Commission's goal is to license satellites in a manner that promotes open entry, competition, maximum flexibility, technical innovation, and seamless networks. To this end, when possible, we seek to afford all applicants an opportunity to compete in the marketplace. Consequently, if the applicants can agree to a sharing scheme that accommodates all pending applications, we generally adopt this approach if it is otherwise in the public interest.²¹ The Ka-band GSO satellite licensees have agreed to an orbital assignment arrangement that accommodates them all; Teledesic, the only NGSO satellite licensee for the spectrum designated for NGSO systems, is also accommodated.

15. The provisions set forth in Part 25 of the Commission's rules, in general, govern the licensing of the fixed-satellite service systems. This includes commercial FSS systems in the Ka-band. The rules impose fairly rigorous financial and technical requirements on commercial FSS applicants. In this *Report and Order*, we modify these rules to incorporate technical operations at the Ka-band. Further, the Part 25 FSS rules were developed in an environment where we regularly receive more applications than we can accommodate. Here the GSO FSS licensees have agreed to an orbital assignment arrangement that will support them all, and we were able to accommodate one NGSO FSS system with room for future entry. Accordingly, as discussed below, we believe it is in the public interest to waive the financial qualification rule sections in processing this round of Ka-band

¹⁹ See Application of Teledesic Corporation for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service, *Order*, 12 FCC Rcd 3154 (1997).

²⁰ See Authorizations of: Comm, Inc. (DA 97-968); GE American Communications, Inc. (DA 97-970); EchoStar Satellite Corporation (DA 97-969); Hughes Communications Galaxy, Inc. (DA 97-971); KaStar Satellite Communications Corp. (DA 97-972); Lockheed Martin Corporation (DA 97-973); Loral Space & Communications Ltd. (DA 97-974); Morning Star Satellite Company, L.L.C. (DA 97-975); NetSat 28 Company, L.L.C. (DA 97-976); Orion Atlantic, L.P. (DA 97-979); PanAmSat Licensee Corp. (DA 97-978); and VisionStar, Inc. (DA 97-980) (International Bureau May 9, 1997).

²¹ See, e.g., Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service, CC Docket No. 92-76, 8 FCC Rcd 8450 (1993) (*First Round "Little LEO" Order*) (applicants successfully reached an agreement that would permit each to be licensed; as a result, the Commission adopted service rules for Little LEO systems that essentially tracked the applicants' proposals).

applications in order to allow for maximum entry.

A. Financial Qualifications

16. Historically, the Commission has fashioned financial requirements for satellite services on the basis of entry opportunities in the particular service being licensed. In cases where we can accommodate all pending applications and future entry is possible, we have not looked to current financial ability as a prerequisite to a license grant. This is because the grant of an authorization to one applicant will not prevent another qualified applicant from advancing with a proposal for the same service.²² We ensure that licensees timely build their systems by requiring them to meet specified implementation milestones. In contrast, where applications for satellites exceed the number of satellites we can accommodate, we have adopted a standard that requires applicants to demonstrate evidence of internal assets or committed financing sufficient to cover construction, launch, and first year operating costs of its entire system.²³ This is based on our experience that under-financed applicants have significant difficulty in the capital markets in raising hundreds of millions of dollars needed to construct and launch a satellite system, even with a license in hand.²⁴ Requiring evidence of full financing therefore prevents a licensee from holding spectrum while it attempts to procure financing, to the detriment of qualified applicants that can immediately go forward with systems and provide service to the public. We require FSS operators to meet this strict standard because the number of applications we receive in the traditional C- and Ku- band FSS frequencies regularly exceeds the number we can authorize.²⁵

17. In the *Third NPRM*, we proposed to apply the existing FSS financial requirement for satellite proposals in the Ka-band. We requested comment on this proposal. Several commenters supported the Commission's proposal to apply this financial test to all 28

²² See, e.g., Radiodetermination Satellite Service, 104 FCC 2d 650 (1986) (Because all pending RDSS applicants could be accommodated and future entry was possible, the Commission required applicants to provide only a detailed business plan). See generally Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626/ 2483.5-2500 MHz Frequency Bands, *Report and Order*, at ¶ 26, 9 FCC Rcd 5936 (1994) ("*Big LEO Report and Order*").

²³ See 47 CFR § 25.140(b)-(e).

²⁴ See, e.g., National Exchange Satellite, Inc., 7 FCC Rcd 1990 (Com. Car. Bur. 1992); Rainbow Satellite, Inc., Mimeo No. 2584 (Com.Car. Bur., released Feb. 14, 1985); United States Satellite Systems, Inc., Mimeo No. 2583 (Com.Car. Bur., released Feb. 14, 1985) (domestic satellite licenses declared null and void for failure to begin implementation as required by license). In addition, Geostar Corporation, a start-up company licensed in the radiodetermination satellite service, declared bankruptcy nearly five years after its licenses were issued. It had not built any of its dedicated satellites.

²⁵ Licensing Space Stations in the Domestic Fixed-Satellite Service, FCC 85-395, CC Docket No. 85-135 (released August 29, 1985), 50 FR 36071 (September 5, 1985).

GHz band satellite systems.²⁶ While Teledesic initially agreed that we should extend the strict FSS financial requirement to NGSO FSS systems, it subsequently stated, in its reply comments, that the existing requirements do not reflect the unique nature of 28 GHz global NGSO satellite systems.²⁷ Some GSO applicants, in their comments to the 28 GHz applicants, expressed concerns with applying the existing financial requirements for FSS systems to 28 GHz band FSS systems.²⁸

18. When we proposed to apply the existing FSS financial requirement to 28 GHz FSS systems, the GSO applicants had not yet agreed to an orbital assignment arrangement that would accommodate them all. In light of their plan, we can grant all of the first round GSO FSS applications, with other "clear" orbit locations remaining available for additional GSO FSS satellites. Further, granting Teledesic's NGSO FSS system application does not preclude future Ka-band NGSO FSS systems.²⁹ Thus, authorizing all proposed first-round systems does not preclude use of this band by other applicants for FSS systems. We therefore will waive the FSS financial requirement for first-round applicants, as reflected in their individual licenses.³⁰ We intend to enforce system milestone schedules strictly to ensure that any licensees who are not able to proceed do not continue to hold valuable orbit and spectrum resources. Further, we emphasize that this waiver applies to this processing group only, and that the application of our financial requirements to any future Ka-band processing round will be addressed in the context of that processing round.

B. Technical Qualifications

19. Applicants for satellite systems must also meet certain technical qualification standards. The Ka-band offers several technical advantages that allow for the implementation of broadband, high capacity FSS applications that otherwise could not be provided in the C- or Ku- bands. For example, the shorter wavelengths in this higher frequency band support the use of transmit-receive earth station antennas significantly smaller than those now in use. They also support significantly smaller satellite spot beams that facilitate frequency reuse, and

²⁶ Comments of Hughes at 35-36; Comments of Loral at 25; and Comments of GE Americom at 21; Comments of Motorola at 22 and 24.

²⁷ Reply Comments of Teledesic at 12.

²⁸ See, e.g., Reply Comments of EchoStar, Ka-Star, VisionStar, and Orion. We recognize that these pleadings were withdrawn, but nevertheless consider the general views submitted in these comments with respect to major issues as informal comments. Several GSO FSS applicants requested a waiver of our financial qualification standard 47 C.F.R. Section 25.140(b)-(e), as did Teledesic.

²⁹ See paras 35-38 below.

³⁰ We previously granted a similar waiver to Norris Satellite, Inc. See note 2.

wider bandwidth and high data rate services.³¹ However, operations at the Ka-band frequencies are also very susceptible to rain fade and other atmospheric attenuations.

20. Many commenters urge the Commission to confirm that the Commission's existing FSS technical requirements and policies apply to satellite systems in the Ka-band.³² As indicated previously, we will, in general, apply existing FSS rules, including technical qualifications requirements, to commercial satellite systems in the Ka-band. In the following text, we discuss modifications or clarifications to several rules that we adopt to accommodate efficient and state-of-the art use of the Ka-band.

GSO Specific Requirements

1. *Spacing*

21. Two degree spacing is the "cornerstone" of our traditional domestic GSO FSS orbital assignment plans. This policy, adopted in 1983, was designed to maximize the number of satellites that could be accommodated in orbit at C- and Ku- bands so that the increasing demand for satellite services could be met.³³

22. The Commission's rules currently require that an applicant for a GSO FSS space station authorization demonstrate how the proposed space station complies with 2 degree orbital spacing requirements. 47 C.F.R. § 25.140. In the *Third NPRM*, we proposed to apply 2 degree spacing to the Ka-band and requested comment on this proposal. This proposal was supported by several commenters.³⁴ GE, in fact, suggested that the Commission explore the possibility of 1 degree spacing in the Ka-band.³⁵ NetSat28, in contrast, argued that the characteristics of this higher frequency band and the innovative technology proposed for this band support a different approach to orbital spacing, specifically, 8 degree spacing.³⁶ However, the orbit assignment plan submitted by the GSO applicants, including NetSat28, spaces their satellites at 2 degree intervals.

³¹ See, e.g., Comments of Hughes at 7.

³² See, e.g., Comments of GE at 20-21 and Hughes at 35-36.

³³ Licensing of Space Stations in the Domestic Fixed-Satellite Service, 54 Rad. Reg. 2d (P&F) 577, 589 (1983) ("*Reduced Orbital Spacing*").

³⁴ See, e.g., Comments of Hughes at 35-36; GE Americom at 20.

³⁵ Comments of GE at 20.

³⁶ Reply Comments of NetSat28 at 2.

23. We believe it is in the public interest, as we establish the Ka-band satellite service, to continue our policy of maximizing the number of satellites that can be accommodated in orbit. If we were to move to GSO orbital arc spacing greater than 2 degrees at this time, we would not be able to accommodate all potential service providers in this first processing round. By submitting a plan using 2 degree spacing, the GSO satellite applicants suggest they can implement viable systems with these spacings. Further, there is nothing in the record to support a finding that one degree spacing, with its increased potential for interference, is feasible at this time. Consequently, we will apply the existing 2 degree spacing policy to U.S. licensed non-Government Ka-band orbital assignments.

2. *Number of Orbit Locations*

24. To accommodate maximum entry while facilitating efficient use of in-orbit resources, we limit, in Part 25, the number of orbit locations a qualified FSS applicant may be initially assigned.³⁷ Historically, this limitation pertained to the provision of domestic FSS in the United States, the objectives being to avoid prematurely assigning an excessive number of orbital locations to an existing licensee for expansion of its domestic system and to promote entry opportunity in the bands.³⁸ Many of the systems proposed in the Ka-band propose to serve geographic areas around the world. In addition, the applicants have also agreed to an arrangement that accommodates all proposed satellites. We also licensed thirteen different GSO FSS system providers in the band and expect that there will be a mix of competitors for services in the band. We believe it is in the public interest to allow these systems, especially those proposing to serve different geographic areas, to proceed as proposed at this point. Therefore, we will waive, for this processing round only, any rules that limit the number of orbit locations that may be assigned to any applicant.

Both GSO and NGSO Requirements

1. *Polarization*

25. The existing Part 25 rules, specifically 47 C.F.R. § 25.210(a), require space stations in the FSS in the 4/6 GHz band to use orthogonal linear polarization.³⁹ We recognize that use of orthogonal circular polarization may also be appropriate in the Ka-band and we wish to allow operators maximum flexibility in choosing the type of polarization best suited for their system design. Also, as in all frequency bands, we seek to maximize frequency

³⁷ See 47 C.F.R. § 25.140(f).

³⁸ See *Licensing Space Stations in the Domestic Fixed-Satellite Service*, 50 Fed. Reg 36071 (September 5, 1985).

³⁹ See 47 C.F.R. § 25.210(a)(1).

reuse and spectrum efficiency. Thus, we modify our Rules to allow for use of either orthogonal linear or orthogonal circular polarization by systems operating in the Ka-band. We will, however, continue to require GSO FSS systems in the C- and Ku-bands to use orthogonal linear polarization.

2. *Frequency Reuse*

26. In the *Third NPRM*, we also proposed to apply the existing FSS requirement for full frequency reuse to the GSO FSS systems that will use the Ka-band.⁴⁰ This rule is contained in Section 25.210(c) of the Commissions rules, 47 C.F.R. § 25.210(c), and requires that FSS space stations employ state-of-the-art full frequency re-use using both horizontal and vertical polarization.

27. NASA asserts that this rule is appropriate for the C- and Ku-band, where systems can double the effective use of the spectrum by cross polarizing the large beams that cover much of the contiguous United States.⁴¹ However, NASA believes that vertical / horizontal cross-polarization is not appropriate for satellite systems employing multiple spot beams, as proposed by the Ka-band systems.⁴² NASA asserts that spot beam satellites achieve frequency reuse in spatially independent beams, with polarization discrimination used to isolate one beam from another. In other words, NASA asserts that spot beam satellites can make the most efficient use of the spectrum by multiple re-use of frequencies in separate beams and that operating in this manner does not permit reusing the same spectrum within a single spot beam. NASA, therefore, proposes an alternative rule that would require Ka-band systems to operate with "X" times frequency reuse within the service area of the FSS system, where "X" remains to be specified.⁴³ Loral also suggests that our current FSS full frequency reuse rule be altered so that satellites are not required to satisfy the full frequency reuse requirement when serving common coverage areas.⁴⁴

28. We believe that the existing full-frequency reuse requirements may not be appropriate for satellite systems in the Ka-band. The band will be home to a new generation of satellites capable of generating multiple narrow-beam spot beams on the surface of the Earth, as well as larger beams. FSS space stations employing multiple spot beams are designed to derive the maximum capacity feasible by reusing frequencies in spatially

⁴⁰ *Third NPRM* at ¶ 126.

⁴¹ Comments of NASA at 22.

⁴² *Id.*

⁴³ *Id.*

⁴⁴ Comments of Loral at 4.

independent beams, rather than by using orthogonally polarized signals within a single beam. Therefore, we will require Ka-band licensees to employ state-of-the-art full frequency reuse either through the use of orthogonal polarizations within the same beam and/or by spatially independent beams.

29. In addition, we adopt a new subsection in Section 25.210, 47 C.F.R. § 25.210, which allows for space stations utilizing spot beam antennas to reuse frequencies in spatially independent beams. We believe that operators should be provided with as much flexibility as possible in their system designs. Therefore, at this time, we choose not to specify the number of times the frequencies should be reused for space stations employing spot beam coverage.

3. *Hybrid Satellites*

30. GE suggests that the Commission permit hybrid satellites to incorporate Ka-band transponders under the standards currently applicable to C- and Ku-band hybrid satellites.⁴⁵ Several applicants in this processing round propose adding Ka-band transponders to authorized or proposed C- and Ku- band hybrid satellites, as well as co-locating two single-band satellites at one orbit location.

31. We have long recognized the cost benefits in implementing several service bands on a single space platform. Consequently, as we do with C- and Ku-band satellites, we will permit Ka-band licensees to build hybrid satellites where they are assigned to corresponding C- and Ka-band, or Ku-band and Ka-band orbit locations, provided all other technical and service requirements for the particular band are met. Any licensee that wishes to consolidate co-located satellites into a hybrid satellite must file an application to modify its underlying licenses.

4. *Power Control Requirements*

32. GSO and NGSO satellite systems planned for operations at Ka-band will be designed with high link margins to compensate for attenuation due to rain fading and other atmospheric losses.⁴⁶ This means that their earth stations will be capable of transmitting at higher powers than will be necessary all of the time. To minimize the amount of interference that a transmitting earth station can cause to another GSO or NGSO satellite system, we seek to adopt some mechanism to ensure that uplink transmission powers are not higher than necessary at any particular time. ITU Radio Regulation S5.541A requires earth station operators transmitting in the 29.1-29.4 GHz band to employ uplink adaptive power control or

⁴⁵ Comments of GE at 21.

⁴⁶ Margin is defined as the excess power with which a satellite link is designed. The excess power helps to overcome unforeseen losses in power of a signal during its transmission.

other methods of fade compensation such that the earth station transmissions will be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between networks. This is a requirement for networks whose coordination information is considered as having been received by the ITU after May 17, 1996, and is encouraged for networks whose coordination information was received before that date. Although the coordination information for the Ka-band networks at issue in this *Report and Order* was received by the ITU before May 17, 1996, we find that uplink power control limits would facilitate operations across the entire 27.5-30.0 GHz band. The uplink level of power control required in the C- and Ku-bands, however, may not be appropriate for systems operating in the Ka-band. We will address the levels of power control that will be needed in the context of our rulemaking regarding earth stations for Ka-band FSS systems.⁴⁷

NGSO Specific Requirements

33. In the *Third NPRM*, we asked whether spectrum efficiency or service availability standards should be adopted for NGSO FSS systems in the Ka-band. Teledesic was the only party who filed timely comments regarding NGSO FSS service rule issues.

1. Coverage Requirement

34. Teledesic suggests that the Commission consider adopting some minimum domestic and international geographic coverage requirements to ensure that NGSO FSS satellite systems, which are inherently global in nature, provide universal access throughout the U.S. and the world.⁴⁸ We agree that NGSO FSS systems are capable of fostering a seamless global communications network and we believe that it serves the public interest to adopt a coverage area requirement for these systems. Consequently, we are adopting the same coverage requirements for 28 GHz systems that we apply to "Big LEO" systems operating in the 1610-1626.5 / 2483.5-2500 MHz bands.⁴⁹ Specifically, we will require 28 GHz NGSO FSS systems to be capable of serving locations as far north as 70 degrees latitude and as far south as 55 degrees latitude for at least 75% of every 24-hour period. We will also require 28 GHz NGSO FSS systems to be capable of providing FSS on a continuous basis throughout the fifty states, Puerto Rico, and the U.S. Virgin Islands.

⁴⁷ See n. 63 *infra* ¶ 57.

⁴⁸ Comments of Teledesic at 28.

⁴⁹ See *Big LEO Report and Order* at ¶ 24; 47 C.F.R. § 25.143(b)(2)(ii);(b)(2)(iii).

2. *Additional NGSO Systems*

35. Qualcomm Incorporated (QualComm) operates a mobile data service utilizing satellites in the Ku-band, and is a partner in the Loral QualComm Partnership, which holds a Commission authorization for a Big LEO system. QualComm asserts that the record in this proceeding may not adequately reflect the extent to which ITU preparatory work for WRC-97 has focused upon whether, and the extent to which, multiple NGSO FSS systems can operate in the spectrum designated for these systems. QualComm requests that the documents associated with CPM-97 Report Section 4.4.1 concerning NGSO FSS Networks be included in the record, and that the Commission take official notice of the WRC-97 preparatory activities as it develops service rules for NGSO FSS systems.⁵⁰

36. We have placed the relevant CPM documents in the record and have taken the results of the CPM Report into account in establishing service rules for NGSO FSS systems. As always, we seek to foster a climate that maximizes competition and promotes multiple entry of systems. Resolution 118 (WRC-95) requests that the ITU-R study, among other things, the sharing between NGSO FSS networks in the Ka-band. ITU-R Working Party-4A studies have identified, and the Commission recognizes, two sharing scenarios: (1) sharing between or among "homogeneous" NGSO FSS systems, and (2) sharing between or among "non-homogeneous" NGSO FSS systems. "Homogeneous" NGSO FSS systems are assumed to have orbits with approximately the same altitude and high inclination angle. Similar technical parameters are not assumed for "non-homogeneous" NGSO FSS systems. Under scenario (1), sharing between multiple "homogeneous" NGSO FSS systems is feasible by interleaving the orbital planes of different NGSO FSS constellations. It may also be possible to interleave satellites from different constellations within the same orbital plane. Because each constellation's satellites are separated spatially under scenario (1), there is no "in-line" interference between NGSO FSS systems, except near the polar regions. This particular sharing scenario requires minimum interaction between the different NGSO FSS systems. ITU-R studies assert that multiple "homogeneous" NGSO FSS systems can be accommodated using these methods. However, it is important to note that sharing between or among "homogeneous" systems imposes similar uniform design constraints on subsequent NGSO FSS systems implemented in the same frequency bands.⁵¹

37. A second sharing scenario exists between or among "non-homogeneous" NGSO FSS systems. Because of the inherently large number of orbital plane crossings, it is not possible to maintain spatial separation between satellites in multiple NGSO FSS

⁵⁰ See Letter from Veronica M. Ahern, Counsel for Qualcomm Incorporated to Donald H. Gips, Chief, International Bureau, November 21, 1996, CC Docket No. 92-297.

⁵¹ Design constraints include limitations on the number of orbital planes, orbital plane inclination, orbit altitude, and earth station antenna patterns.

constellations.⁵² Consequently, other types of mitigation techniques (e.g., exclusion zones, satellite diversity, or high gain antennas) would need to be employed by each NGSO FSS system. The Commission also recognizes that further division of the spectrum, which would result in a reduction of each system's capacity, is also a feasible alternative if sharing proves to be unacceptable to any particular NGSO FSS system.

38. We are not now in a position to determine exactly how many non-Government NGSO FSS systems, and in particular, how many "non-homogeneous" type systems, will be able to operate in the 18.8-19.3 / 28.6-29.1 GHz bands. Further, we note that many satellites undergo design changes during implementation that could facilitate sharing among systems. Additionally, second generation systems usually become more efficient, further facilitating the operation of multiple systems. Consequently, we will not now mandate any specific sharing principles or mitigation techniques to be used in coordination between or among non-Government NGSO FSS systems. However, we expect all non-Government NGSO FSS systems to be responsible for some portion of the burden-sharing. Specifically, we expect all NGSO FSS licensees to bear some portion of the technical and operational constraints necessary to accommodate multiple "non-homogeneous" NGSO FSS systems. In apportioning burden, it may be appropriate to consider factors such as whether a particular NGSO FSS satellite is already in-orbit and operational. If NGSO FSS non-Government systems are unable to share spectrum, another feasible alternative is to further divide the spectrum designated in the United States for non-Government NGSO FSS systems, between or among licensed operators. We will evaluate all applications for NGSO FSS systems on a case-by-case basis, revisiting the multiple entry issue, as necessary, as we gain more experience with NGSO FSS systems.

C. Implementing the Band Plan Domestically

39. The 28 GHz band plan designates domestic licensing priority for certain non-Government services or systems in specific band segments. We designated co-frequency sharing between services or systems only in band segments where the Commission and the parties concluded it is technically feasible. In the *28 GHz Band First Report and Order* we further designated domestic licensing priority for certain types of fixed-satellite services with respect to other types of fixed-satellite services in specific band segments. For example, in the 28.35-28.60 GHz band segments, GSO FSS systems have licensing priority over NGSO FSS systems, and in the 28.6-29.1 GHz segment, NGSO FSS systems have licensing priority over GSO FSS systems. This licensing priority between systems in the same service has a

⁵² "In-line" interference occurs when satellites from separate NGSO FSS systems operate in the region where each system's orbital planes cross.

similar interpretation as a "secondary" service with respect to a "primary" service.⁵³ Accordingly, we will require any service provider proposing to operate in a band segment in which it does not have licensing priority, to operate on an unprotected non-interference basis to the priority service. To ensure non-interfering operations, we will require all secondary operators to submit to the Commission a technical demonstration that it can operate on a non-harmful interference basis to the type of satellite system with licensing priority. This technical demonstration will be subject to public comment before we authorize any secondary operations in the bands. In addition, we will require secondary users to immediately cease operations upon notification of harmful interference into any service or system that has superior status or licensing priority in a particular band segment.

40. In the following text, we briefly discuss implementation of the 28 GHz GSO FSS and NGSO FSS non-Government systems in specific band segments.

1. Uplink Frequency Bands

LMDS fss	GSO FSS ngso fss	NGSO FSS gso fss	MSS FEEDER LINKS & LMDS (h-s)	MSS FEEDER LINKS & GSO/FSS	GSO FSS ngso fss
850 MHz	250 MHz	500 MHz	150 MHz	250 MHz	500 MHz
27.5	28.35	28.60	29.1	29.25	29.5
30.0 GHz					

a. GSO FSS systems

41. Under the band plan, GSO FSS systems may operate in the following bands: 27.50-28.35 GHz; 28.35-28.60 GHz; 28.60-29.10 GHz; 29.25-29.50 GHz, and 29.50-30.0 GHz. Their status in these bands varies, however. First, GSO FSS systems are designated

⁵³ "Secondary" generally refers to a category of service with respect to other radio services. Stations of a secondary service shall not cause harmful interference to stations of primary or permitted services; cannot claim protection from harmful interference from stations of a primary or permitted service, but can claim protection from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date. See 47 CFR § 2.104(d); 47 CFR § 2.105(c)(3). As a general matter, the Commission does not coordinate secondary operations with respect to primary or permitted services.

exclusive primary spectrum in the 28.35-28.60 and 29.50-30.0 GHz band segments.⁵⁴ Consequently, their operations are protected in these bands. Specifically, in these bands, no other service can cause interference to GSO FSS transmissions nor can any other service claim interference protection from GSO FSS systems. Second, the 29.25-29.50 GHz band segment is designated on a co-primary basis with feeder links for Big LEO systems. GSO FSS operators in this band segment must comply with the coordination rules between GSO FSS and Big LEO systems established in the *28 GHz Band First Report and Order*. In that *Order*, we adopted rules based on spectrum sharing principles developed by TRW, a Big LEO licensee who proposed feeder links in the Ka-band, and Hughes, who proposed a GSO FSS system in the same band.⁵⁵ Specifically, TRW and Hughes agreed that the system causing unacceptable interference has primary responsibility to mitigate interference, but that neither system would be required to disrupt or alter its transmissions. Moreover, TRW agreed to provide the location of its two feeder link earth stations in the United States to GSO satellite licensees operating in the same band. At the same time, we required that all GSO FSS licensees use frequency and polarization selection techniques in the area of TRW's earth station complexes to minimize instances of unacceptable interference between the GSO FSS and feeder link systems. See Section 25.258, 47 C.F.R. § 25.258.

42. Last, the 28 GHz band plan designates GSO FSS operation on a secondary basis in certain band segments. Specifically, both GSO and NGSO FSS operators are designated as secondary users with respect to LMDS in the 27.50 to 28.35 GHz band. Consequently, GSO and NGSO FSS systems have equal status as secondary users in this band segment. As a practical matter, it is unlikely that FSS can operate ubiquitous terminals on a unprotected non-interference basis to LMDS. GSO FSS systems are also designated on a secondary priority basis to NGSO FSS systems in the 28.60 to 29.10 GHz band segment. As a secondary user in these band segments, GSO FSS operators shall not cause harmful interference to stations of a primary service, or higher priority FSS system, nor can they claim protection from harmful interference from stations of a primary service, or higher priority FSS system.⁵⁶

⁵⁴ In the *28 GHz Band First Report and Order*, Cellularvision, the only currently operating LMDS system, was grandfathered in the 28.35-28.5 GHz band segment. We required CellularVision to vacate the 28.35-28.50 GHz band 24 months from the release date of the report and order, or by the date of launch of the first GSO satellite intended to provide service in the United States, whichever occurs later. The satellite licensee is responsible for giving CellularVision, upon its request, an update on the satellite's status. CellularVision has the responsibility to remain apprised of the satellite's status and to ensure that LMDS operations cease on the 150 MHz designated for GSO/FSS operations.

⁵⁵ Several of the GSO FSS licensees have also supported these sharing principles.

⁵⁶ See *supra* n. 53.

b. NGSO FSS

43. Under the plan, NGSO FSS systems may operate in the following bands: 27.50-28.35; 28.35-28.60; 28.60-29.10; and 29.50-30.0 GHz. The priority designation for NGSO systems is at 28.60-29.10 GHz. As noted previously, 500 MHz of paired spectrum has been identified internationally for NGSO FSS operations. The 28.7-29.1 GHz and 18.9-19.3 GHz bands were made available for immediate NGSO FSS use, while the 28.6-28.7 GHz and 18.8-18.9 GHz bands were "frozen" with further action to be considered at WRC-97. As stated in the First Report and Order, we will continue to pursue an international allocation at WRC-97 for the 100 MHz of paired spectrum at 28.60-28.70 / 18.80-18.90 GHz for NGSO FSS global operations. In the *28 GHz Band First Report and Order* we stated that we were designating 500 MHz for NGSO FSS systems domestically to accommodate the increasing worldwide demand for these systems.⁵⁷ A 500 MHz designation also preserves the possibility for competitive NGSO FSS systems to be implemented in this band.

44. We designated NGSO FSS on a secondary priority basis to GSO FSS systems in the 28.35-28.60 and 29.50-30.0 GHz band segments. As a secondary user in these band segments, NGSO FSS operators shall not cause harmful interference to or claim protection from any service or system that has superior status or licensing priority.

2. *Downlink Frequency Bands*

45. The plan adopted in the *28 GHz Band First Report and Order* for non-Government downlink frequency bands is depicted as follows:

Downlink Band 17.70 - 20.2 GHz

GSO/FSS FIXED ngso/fss	NGSO/FSS FIXED gso/fss	MSS F.L. FIXED gso/fss	GSO/FSS ngso/fss
1100 MHz	500 MHz	400 MHz	500 MHz
17.70	18.80	19.30	19.70
			20.20 GHz

⁵⁷ 28 GHz Band First Report and Order at ¶ 59.

a. GSO FSS

46. Non-Government GSO FSS systems will be authorized to use downlink frequencies on a priority basis in the 17.70-18.80 and 19.70-20.2 GHz bands. The 17.70-18.80 GHz band is designated on a co-primary basis with fixed services. We designated this entire 1.1 GHz band segment to provide GSO FSS licensees with flexibility to implement their systems. There are several restrictions on the use of this band, including the need to protect broadcast satellite service downlinks in the 17.70-17.80 GHz band after April 1, 2007; power flux density limits to protect passive sensors in the earth exploration-satellite and space research services in the 18.60-18.80 GHz band, and the need to coordinate with fixed services in the 17.70-19.70 GHz band.⁵⁸ We require GSO FSS licensees to comply with all of these restrictions. Nevertheless, we expect GSO FSS licensees will be able to identify and coordinate 500 MHz in this 1.1 GHz band to give these systems a total of up to 1000 MHz in the downlink transmission direction.

47. We designated non-Government GSO FSS systems on a secondary priority basis in the 18.80-19.70 GHz band segments. As a secondary user in these band segments, GSO FSS operators shall not cause harmful interference to stations of a primary service, or higher priority FSS system, nor can they claim protection from harmful interference from stations of a primary service, or higher priority FSS system.⁵⁹

48. Further, all licensees must coordinate with the U.S. Government systems authorized in the 17.80-20.20 GHz band, in accordance with US footnote 334 in the Table of Frequency Allocations. U.S. footnote 334 reads as follows: "In the band 17.80-20.20 GHz, Government space stations and associated earth stations in the fixed-satellite (space-to-Earth) service may be authorized on a primary basis. For a Government geo-stationary satellite network to operate on a primary basis, the space station shall be located outside the arc measured from East to West, 70° W to 120° W. Coordination between Government fixed-satellite systems and non-Government systems operating in accordance with the United States Table of Frequency Allocations is required."⁶⁰

⁵⁸ See *28 GHz Band First Report and Order* at ¶ 78; see also ITU RR No. S5.517 (869A) (which relegates FSS downlink operations in the 17.7-17.8 GHz band to secondary status in Region 2 after April 1, 2007); see also 47 C.F.R. § 2.106 US footnote 255, which limits FSS downlink operations in the 18.6-18.8 GHz band to a power flux density at the Earth's surface of -101 dBW/m² in a 200 MHz band for all angles of arrival; see also § 25.208(c) which specifies pfd limits which must be met at the Earth's Surface by all FSS systems in the 17.7-19.7 GHz band to facilitate coordination with fixed services.

⁵⁹ See *supra* note 47.

⁶⁰ See 47 CFR § 2.106 US footnote 334.

b. NGSO FSS

49. The 18.8-19.3 GHz band is designated for non-Government NGSO FSS use on a co-primary basis with the fixed service and with Government services. We require NGSO FSS systems to coordinate with any existing and future point-to-point fixed systems in the band.⁶¹ We also designated NGSO FSS on a secondary priority basis in the 17.7-18.8 and 19.7-20.2 GHz band segments. As a secondary user, NGSO FSS operators shall not cause harmful interference to stations of a primary service, or higher priority FSS system, nor can they claim protection from harmful interference from stations of a primary service, or higher priority FSS system.⁶² NGSO FSS systems must also coordinate with the Government systems operating in the band 18.8-19.3 GHz in accordance with U.S. footnote 334.

D. Earth Station Licensing

50. We anticipate making changes to our existing Part 25 requirements for earth stations in the C- and Ku-bands to take into account operations at Ka-band. In fact, four GSO satellite applicants have submitted a petition for rulemaking to the Commission.⁶³ The Petitioners request that the Commission institute a rulemaking proceeding to revise Part 25 of the Commission's Rules, 47 C.F.R. § 25.101, in order to provide for the routine licensing of large numbers of small antenna earth stations operating in the 19.7-20.2/29.5-30.0 GHz bands for GSO FSS. Teledesic supports the Petition and further suggests the scope of the rulemaking be expanded to include the entire available Ka-band frequencies.⁶⁴

E. Inter-Satellite Service

51. Many system proponents in the Ka-band propose to use inter-satellite service (ISS) frequencies to interconnect satellites within their respective networks.⁶⁵ These proposed

⁶¹ We note, however, that in a separate proceeding we have relocated a fixed service, the Digital Electronic Message Service ("DEMS") from the 18.82-18.92 and 19.16-19.26 GHz bands to the 24.25-24.45 and 25.05-25.25 GHz bands. *See* Amendment of the Commission's Rules to Relocate the Digital Electronic Message Service From the 18 GHz band to the 24 GHz band and To Allocate Band For Fixed Service, 12 FCC Rcd 3471, FCC 97-95, (adopted March 14, 1997). This Order is subject to petitions for reconsideration.

⁶² *See supra* note 49.

⁶³ *See* Routine Licensing of Large Numbers of Small Antenna Earth Stations Operating in the Ka-Band, *Petition for Rulemaking*, RM-9005, submitted December 20, 1996, by: GE, Loral, Lockheed Martin and Hughes.

⁶⁴ *See* Comments of Teledesic at 3.

⁶⁵ *See* Applications of EchoStar, Ka-Star, Lockheed Martin, Hughes, Loral, Comm. Inc., and Teledesic.

bands include the 22.55-23.55 GHz / 32.0-33.0 GHz / 54.25-58.2 GHz and 59-64 GHz bands.

52. One licensee, Hughes, proposes to use the 22.55-23.55 GHz and 32.0-33.0 GHz bands for some of its inter-satellite links. These bands are shared on a co-equal basis with U.S. Government operations. In addition, one of the "Big LEO" systems is licensed to operate inter-satellite links in the 22.55-23.55 GHz band. Any 28 GHz systems licensed to operate inter-satellite links in these bands would be required to coordinate with U.S. Government systems through the Frequency Assignment Subcommittee (FAS) of the Inter-Governmental Radio Advisory Committee (IRAC) and with other non-Government licensees in the band. At this time, we defer action on any authorizations in the 22.55-23.55 and 32.0-33.0 GHz bands until we receive more information on the specific frequencies Hughes needs for its system and we have coordinated with the Government.

53. Two other licensees propose to use the 54.25-58.2 GHz bands for inter-satellite links. The 54.25-58.2 GHz band is allocated domestically and internationally on a co-primary basis to the earth exploration-satellite service (EESS) (passive), fixed, mobile, space research (passive) and inter-satellite services. Use of these bands is shared on a co-equal basis between U.S. Government and non-Government operations. Studies carried out in the ITU-Radiocommunication Sector have determined that NGSO ISS operations in this band would cause unacceptable interference into the EESS. Thus, non-Government NGSO ISS operations will not be permitted in this band. Studies have also shown that GSO ISS operations are feasible in this band provided that a power flux density limit is met at all altitudes from 0 to 1000 km to protect passive NGSO satellite system operations.⁶⁶ The appropriate power flux-density (pfd) limit has been the subject of study within the ITU Radiocommunication Sector and will be finalized at WRC-97. Further, the U.S. Government has existing and planned ISS systems in the 56.9-57 GHz band segment. All GSO FSS inter-satellite link operations in the 54.25-58.2 GHz band would be required to coordinate with U.S. Government systems through the FAS. At this time, however, we do not know the number of commercial GSO ISS systems that can simultaneously operate in this band, nor do we know whether all of the GSO FSS licensees requesting spectrum for ISS operations can be accommodated in 54.25-58.2 GHz. Any GSO inter-satellite link operation in the bands would be subject to coordination with U.S. Government operations in the band and subject to the pfd limit that is to be determined at WRC-97.

54. Finally, other licensees propose to use the 59-64 GHz band for inter-satellite links. This band is allocated domestically and internationally on a co-primary basis to the

⁶⁶ See ITU Study Group 4 Document 4/57, 22 January 1997 on the "Feasibility of Sharing Between Spaceborne Passive Sensors of the Earth Exploration-Satellite Service and Inter-Satellite Links of the Geostationary-Satellite Networks in the Range 50 to 65 GHz"; see also ITU-R Recommendation S.1327, "Requirements and Suitable Bands for Operation of the Inter-Satellite Service within the Range 50.2-71 GHz," (18 September 1997).

inter-satellite service, the fixed service, the mobile service, and the radiolocation service. Use of these bands is also shared on a co-equal basis between Government and non-Government operations. There appear to be significant interference problems associated with potential non-Government GSO and NGSO operations and Government operations at 59-64 GHz.⁶⁷

55. The Commission and the National Telecommunications and Information Administration (NTIA), which has primary jurisdiction over Government use of spectrum, have had discussions regarding the potential for interference that would be associated with non-Government GSO or NGSO FSS operations in the 54.25-58.2 GHz and 59-64 GHz bands. The 54.25-58.25 GHz band appears more promising for the inter-satellite service to support non-Government GSO FSS operations. We are also working with NTIA to develop a U.S. proposal to WRC-97 for an allocation in the 65-71 GHz band for inter-satellite service links for both GSO and NGSO FSS systems.⁶⁸ We are optimistic that we will obtain sufficient spectrum internationally to support Ka-band system inter-satellite link operations. Nevertheless, we did not delay issuing licenses pending the allocation of suitable spectrum for inter-satellite links. Once suitable spectrum is available, we will require licensees to apply for operating authority on specific operating frequencies. Further, because licensees will not be able to proceed beyond the initial phases of construction until the inter-satellite link issues are resolved, we did not impose any system implementation milestones until we grant authority to launch and operate individual systems using specific inter-satellite link spectrum. We will hold all licensees to the strict milestone schedule discussed above, once the respective inter-satellite frequencies are authorized. In the interim, all licensees are free to begin construction at their own risk. We recently waived the construction permit requirement for space stations. This decision, effective April 21, 1997, means that applicants no longer need Commission authorization in order to build their proposed satellites. Any construction prior to obtaining an operating license is, however, solely at the applicant's own risk and will not predispose the Commission to grant it launch and operating authority.⁶⁹

56. There will also be the need for coordination among inter-satellite service systems. As in the Big LEO context, applicants for authority to establish inter-satellite service links must coordinate their proposed frequency usage with existing permittees and licensees in the inter-satellite service whose facilities could be affected by the new proposal in terms of frequency interference or restricted system capacity.⁷⁰ All affected applicants,

⁶⁷ See Letter from Richard Parlow, Associate Administrator, National Telecommunications and Information Administration to Richard Smith, Chief, Office of Engineering and Technology, FCC dated May 4, 1995.

⁶⁸ See "United States Proposals No. 209 and No. 210 for the Work of the Conference" (August 1997).

⁶⁹ See Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures, *Report and Order*, 11 FCC Rcd 21581 (1996).

⁷⁰ 47 CFR § 25.279(b).

permittees, and licensees, shall at the direction of the Commission, cooperate fully and make every reasonable effort to resolve technical problems and conflicts that may inhibit effective and efficient use of the radio spectrum; however, the permittee or licensee being coordinated with is not obligated to suggest changes or re-engineer an applicant's proposal in cases involving conflicts.

F. Competitive Bidding Proposal

57. In the *Third NPRM*, we proposed to use competitive bidding as the mechanism to choose among mutually exclusive applications proposing to provide domestic service within the United States.⁷¹ We received comments that were, overall, unfavorable to any form of competitive bidding procedures for satellite systems in the Ka-band.⁷² Given the GSO FSS orbital assignment agreement among the applicants, and the fact we could accommodate the NGSO FSS system, the first-round of Ka-band applications were not mutually exclusive. Therefore, this issue has become moot. If, however, we are unable to accommodate all qualified applicants in a future processing round, we may revisit the notion of employing a competitive bidding approach to resolve mutual exclusivity among proposed satellite systems for both GSO and NGSO FSS systems.

G. Service Rules

1. Regulatory Treatment

58. In our *DISCO I Order*, we determined that all fixed-satellite operators in the C-band and Ku-band could elect to operate on a common carrier or non-common carrier basis.⁷³ We see no reason to treat satellite operators in the Ka-band any differently. The Commission traditionally has evaluated requests to operate on a non-common carrier basis using the analysis set forth in *National Association of Regulatory Utility Commissioners v. FCC*,⁷⁴ (*NARUC I*). Under *NARUC I*, we may regulate an entity as a private carrier unless: (1) there

⁷¹ See *Third NPRM* at ¶ 128; ¶¶ 143-145.

⁷² See, e.g., Comments of GE at 22-25; Hughes at 31-44; Lockheed Martin at 4-9; Loral at 8; Motorola at 19-22; NASA at 23; Orion Network Systems at 3-5; PanAmSat at 3-10; Satellite Industry Association at 2-18 and Teledesic at 22.

⁷³ See In the Matter of Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Satellite Systems and DBSC Petition for Declaratory Rulemaking Regarding the Use of Transponders to provide international DBS Service, 11 FCC Rcd 2429, 2436 (1996) (*DISCO I Order*).

⁷⁴ *National Ass'n of Regulatory Utility Commissioners v. FCC*, 525 F.2d 630 (D.C. Cir.), cert. denied, 425 U.S. 992 (1976); 47 U.S.C. § 153(44).

is or should be any legal compulsion to serve the public indifferently; or (2) there are reasons implicit in the nature of the service to expect that the entity will in fact hold itself out indifferently to all eligible users.

59. Several of the Ka-band FSS applicants propose to operate all services on a non-common carrier basis.⁷⁵ Regarding the first prong of *NARUC I*, we do not see any legal compulsion to require any space station licensee in the Ka-band to operate on a non-common carrier basis. We have already determined there is sufficient competitive capacity available in the C-and Ku-bands to assure the U.S. public ample access to fixed-satellite services.⁷⁶ In addition, we have licensed thirteen GSO FSS systems and one NGSO FSS system in the Ka-band which propose to offer a wide variety of broadband voice, data and video services to the U.S. domestic consumer.

60. Regarding the second prong of *NARUC I*, we find there is little likelihood that such Ka-band licensees will hold themselves out indifferently to serve the public. New Ka-band offerings can be tailored to provide a broad array of specialized communications services ranging from videoconferencing to telemedicine; and these services may be styled to accommodate highly individualized methods of operation and demands of potential customers. We believe permitting Ka-band licensees to offer services on a non-common carrier basis is in the public interest.

2. *Implementation Milestones*

61. As in all other satellite services, all licensees will be required to adhere to a strict timetable for system implementation. This ensures that licensees are building their systems in a timely manner and that the orbit-spectrum resource is not being held by licensees unable or unwilling to proceed with their plans. The implementation schedules for 28 GHz systems will generally track the schedules imposed in other satellite services. For these satellites, this means that construction must be commenced within one to two years of grant and the satellite must be launched and operational within five years of license grant. Nevertheless, we recognize, that several GSO FSS 28 GHz systems are designed with multiple satellites at each of several orbit locations and that construction of these large numbers of satellites may take additional time. We must balance this, however, against our goal of preventing warehousing. Consequently, we will require each GSO FSS licensee to begin construction of its first satellite within one year of grant, to begin construction of the remainder within two years of grant, to launch at least one satellite into each of its assigned

⁷⁵ But see EchoStar Satellite Corporation Application for Authority to Construct, Launch, and Operate a Ka-Band Satellite System in the Fixed-Satellite Service, *Order and Authorization*, DA 97-969, (released May 9, 1997). EchoStar proposes to operate its system on a common carrier basis.

⁷⁶ See *DISCO I Order* at ¶ 46.